CLAIMS:

1. A seal for preventing leakage of a fluid from between two members, the seal comprising:

a seal body for fluid tight contact with both members so as to prevent leakage of fluid between either of the members and the seal body, the seal body being more readily abraded than either of the two members, the seal body being adapted to retain a fluid tight seal with the two members as long as the seal body has not abraded beyond a selected depth;

an optical conductor positioned approximately at the specified depth within the seal body such that deterioration of the seal body beyond the specified depth causes a change in the optical conductor; and

a sensor for detecting the change in the optical conductor.

2. The seal of claim 1 wherein the deterioration of the seal body results in less than total internal reflectance within the optical conductor.

3. The seal of claim 1 wherein the two members move relative to one another and wherein the seal maintains the fluid tight contact with both members throughout a range of motion.

4. The seal of claim 1 wherein the two members reciprocate with respect to each other in a fluid tight sealing relationship.

5. The seal of claim 1, wherein the sensor is connected to one end of the optical conductor and further comprising:

a signaling circuit for transmitting an optical signal through the optical conductor to the sensor.

6. The seal of claim 1 wherein the sensor detects a change in light at the seal and further comprising:

a signaling circuit for transmitting an optical signal through the optical conductor, such that wear of the optical conductor causes refracted light to escape from worn areas of the conductor.

7. A sealing system for maintaining continuity of a seal between two members to prevent leakage of a fluid, the sealing system comprising:

a seal body positioned between the two members and adapted to retain a fluid-tight sealed relationship between the two members, the seal body being more readily abraded than the two members by movement of the two members relative to one another, the seal body for maintaining the fluid-tight sealed relationship until the seal body is abraded beyond a specific depth; and

an optical conductor positioned relative to the seal body such that abrasion of the seal body beyond the specific depth causes an optical discontinuity of the optical conductor, indicating a need for seal body replacement.

8. The sealing system of claim 7 wherein the two members slide with respect to one another in a fluid tight sealed relationship.

9. The sealing system of claim 7 and further comprising:

a sensor for monitoring an optical change at one end of the optical conductor.

10. The sealing system of claim 7 and further comprising:

a sensor for monitoring a change in illumination at the seal body.

11. The sealing system of claim 7 wherein the optical conductor is positioned within the seal body approximately at the specific depth.

12. The sealing system of claim 7 further comprising:

a light source at a first end of the optical conductor for transmitting light through the optical conductor; and

a sensor positioned at a second end of the optical conductor for receiving and detecting a change in the transmitted light, the change indicating an optical discontinuity in the optical conductor.

13. A method of determining whether a seal that prevents passage of a fluid between two members should be replaced because of wear, the method comprising:

positioning the seal between and in engaged contact with the two members so as to prevent passage of fluid between the seal and either of the members, the seal being more readily abraded than either of the two members and being adapted to retain a fluid tight seal with the two members as long as the seal body has not abraded beyond a specified depth; and

associating an optical conductor with the seal such that abrasion of the seal beyond the specified depth causes optical discontinuity of the optical conductor, indicating a requirement for seal replacement.

14. The method of claim 13 wherein the two members move relative to one another in a fluid tight sealing relationship.

15. The method of claim 13 wherein the two members slide or reciprocate with respect to one another in a fluid tight sealing relationship.

16. The method of claim 13 wherein the step of associating an optical conductor comprises:

embedding the optical conductor in the seal at approximately the specified depth.

17. The method of claim 13 further comprising:

measuring a change in light over the optical conductor.

18. A seal with a means for detecting replacement conditions comprising:

a seal body for maintaining a fluid tight sealed relationship between members so as to prevent fluid leakage as long as the seal body has not deteriorated beyond a specific depth; and

an optical device positionally associated with the seal body such that deterioration of the seal body beyond the specific depth causes the optical device to detect a change with respect to the seal, indicating a need for seal replacement.

19. The seal according to claim 18 wherein the optical device is a spectrometer, the seal further comprising:

a coating on the optical conductor embedded within the seal body such that as the seal body is abraded, the coating is exposed, the spectrometer detecting the coating when the coating begins to reflect light above a threshold level of luminescence.

20. The seal of claim 19 wherein the coating is a reflective paint.

21. The seal of claim 19 wherein the coating is a flourescent material.

22. The seal of claim 18 wherein the optical device is a conductor embedded within the seal body at the specific depth, the seal further comprising:

a sensor attached to the optical device such that when the seal body is abraded beyond the specific depth, the sensor detects ambient light from the optical device, signaling the requirement for seal replacement.

23. The seal of claim 18 wherein the optical device is a conductor embedded within the seal body at the specific depth, the seal further comprising:

a light source attached to one end of the optical device; and

a sensor positioned proximate to the optical device such that when the seal body is abraded beyond the specific depth, the sensor detects light from the light source through the optical device, signaling the requirement for seal replacement.